

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1. (Canceled).

2(Currently Amended). An anaerobic microbial fermentation The process for the production of acetic acid, said process comprising the steps of: according to claim 1,

(a) fermenting in a bioreactor at least one gas selected from the group consisting of (1) carbon monoxide, (2) carbon dioxide and hydrogen, (3) carbon monoxide, carbon dioxide, and hydrogen, and (4) carbon monoxide and hydrogen, in the presence of an aqueous stream comprising a nutrient mixture with an anaerobic acetogenic bacteria, thereby producing a fermentation broth comprising acetic acid and wherein said fermentation broth further comprises dissolved hydrogen sulfide and said process further comprises the step of:

(b) removing said hydrogen sulfide from said fermentation broth prior to extraction;

(c) contacting said fermentation broth with a solvent comprising an amine for a time sufficient to cause the formation of a solvent phase containing acetic acid, said solvent and water and an aqueous phase;

(d) continuously distilling acetic acid from said solvent phase; and

(e) recycling said solvent to said contacting step (b).

3(Previously Presented). The process according to claim 2, wherein said removing step comprises contacting said fermentation broth with a gas which does not contain carbon dioxide, oxygen or hydrogen sulfide.

4(Previously Presented). The process according to claim 3 wherein said gas is selected from the group consisting of nitrogen, methane, helium, carbon monoxide, argon, hydrogen, a non-reactive gas, and a mixture thereof.

5(Original). The process according to claim 3, wherein said removing step occurs in a countercurrent stripper column.

6(Previously Presented). The process according to claim 2, wherein said removing step comprises reducing the pressure on said fermentation broth in a container separate from said bioreactor.

7(Currently Amended). The process according to claim 4 2 further comprising separating said bacteria from other components in said broth to provide a substantially cell-free stream.

8(Previously Presented). The process according to claim 2, wherein said removing step comprises heating said cell-free stream to about 80°C in a container separate from said bioreactor.

9(Currently Amended). The An anaerobic microbial fermentation process for the production of acetic acid, said process comprising the steps of: according to claim 1, wherein said solvent comprises

(a) fermenting in a bioreactor at least one gas selected from the group consisting of (1) carbon monoxide, (2) carbon dioxide and hydrogen, (3) carbon monoxide, carbon dioxide, and hydrogen, and (4) carbon monoxide and hydrogen, in the presence of an aqueous stream comprising a nutrient mixture with an anaerobic acetogenic bacteria, thereby producing a fermentation broth comprising acetic acid;

(b) contacting said fermentation broth with a solvent for a time sufficient to cause the formation of a solvent phase containing acetic acid, said solvent and water and an aqueous phase, wherein said solvent comprises:

(i) a water immiscible solvent comprising greater than 50% by volume of a mixture of isomers of highly branched di-alkyl amines, and from about 0.01% to 20% by volume of mono-alkyl amines, said solvent having a coefficient of distribution greater than 10; and

(ii) at least 10% by volume of a non-alcohol co-solvent having a boiling point lower than the boiling point of said solvent (i),

wherein said mixture extracts acetic acid from aqueous streams;

(c) continuously distilling acetic acid from said solvent phase; and

(d) recycling said solvent to said contacting step (b).

10(Original). The process according to claim 9, wherein said distilling step occurs at a temperature less than about 160°C, without substantially degrading said amine to an amide, thus enhancing the efficiency of production of acetic acid.

11(Previously Presented). The process according to claim 7, further comprising recycling said separated bacteria into said bioreactor.

12(Currently Amended). The process according to claim 4, wherein said anaerobic bacteria is selected from the group consisting of *Acetobacterium kivui*, *A. woodii*, *Butyribacterium methylotrophicum*, *Clostridium aceticum*, *C. acetobutylicum*, *C. formicaceticum*, *C. kluyveri*, *C. thermoaceticum*, *C. thermocellum*, *C. thermohydrosulfuricum*, *C. thermosaccharolyticum*, *Eubacterium limosum*, *Peptostreptococcus productus*, *C. ljungdahlii*, and mixtures thereof.

13(Currently Amended). The process according to claim 12, wherein said *C. ljungdahlii* is selected from the group consisting of: PETC ATCC 55383 49587, O-52 ATCC 55989, ERI2 ATCC 55380, C-01 ATCC 55988, and mixtures thereof.

14(Currently Amended). The process according to claim 12, wherein said contact with solvent occurs in a countercurrent column.

Claims 15-23. (Canceled)

24(Currently Amended). ~~The An anaerobic microbial fermentation process according to claim 1, for the production of acetic acid, said process comprising the steps of:~~

- (a) ~~fermenting in a bioreactor at least one gas selected from the group consisting of (1) carbon monoxide, (2) carbon dioxide and hydrogen, (3) carbon monoxide, carbon dioxide, and hydrogen, and (4) carbon monoxide and hydrogen, in the presence of an aqueous stream comprising a nutrient mixture with an anaerobic acetogenic bacteria, thereby producing a fermentation broth comprising acetic acid and wherein said fermentation broth further comprises dissolved carbon dioxide;~~
- (b) ~~and said process further comprises the step of removing said carbon dioxide from said fermentation broth; prior to extraction~~
- (c) ~~contacting said broth of (b) with a solvent comprising an amine for a time sufficient to cause the formation of a solvent phase containing acetic acid, said solvent and water and an aqueous phase;~~
- (d) ~~continuously distilling acetic acid from said solvent phase; and~~
- (e) ~~recycling said solvent to said contacting step (c).~~

25(Currently Amended). The An anaerobic microbial fermentation process according to claim 1, for the production of acetic acid, said process comprising the steps of:

(a) fermenting in a bioreactor at least one gas selected from the group consisting of (1) carbon monoxide, (2) carbon dioxide and hydrogen, (3) carbon monoxide, carbon dioxide, and hydrogen, and (4) carbon monoxide and hydrogen, in the presence of an aqueous stream comprising a nutrient mixture with an anaerobic acetogenic bacteria, thereby producing a fermentation broth comprising acetic acid;

(b) contacting said broth of (a) with a solvent for a time sufficient to cause the formation of a solvent phase containing acetic acid, said solvent and water and an aqueous phase, wherein said solvent comprises:

(i) a water immiscible solvent comprising greater than 50% by volume of a mixture of isomers of highly branched di-alkyl amines, and from about 0.01% to 20% by volume of mono-alkyl amines, said solvent having a coefficient of distribution greater than 10; and

(ii) at least 10% by volume of a linear hydrocarbon co-solvent having a boiling point lower than the boiling point of said solvent (i),

wherein said mixture extracts acetic acid from aqueous streams;

(c) continuously distilling acetic acid from said solvent phase; and

(d) recycling said solvent to said contacting step (b).

26(Currently Amended). The process according to any of claims 1 or claim 2, wherein said bacteria is *Clostridium*.

27(Currently Amended). The process according to claim 1 or 2, wherein said aqueous phase is recycled to said bioreactor.

Claim 28. (Canceled)

29(New). The process according to claim 9, wherein said bacteria is *Clostridium*.

30(New). The process according to claim 24, wherein said bacteria is *Clostridium*.

31(New). The process according to claim 25, wherein said bacteria is *Clostridium*.

32(New). The process according to claim 9, wherein said aqueous phase is recycled to said bioreactor.

33(New). The process according to claim 24, wherein said aqueous phase is recycled to said bioreactor.

34(New). The process according to claim 25, wherein said aqueous phase is recycled to said bioreactor.